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SMART TRAFFIC SIGNAL MANAGEMENT USING ARTIFICIAL INTELLIGENCE

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ABSTRACT

With expanding urban populace and subsequently the quantity of vehicles, need of controlling avenues, interstates and streets is significant issue. The fundamental purpose for the present traffic issue is the systems that are utilized for traffic the board. The present traffic the board system has no accentuation on live traffic situation, which prompts wasteful traffic the executives systems. These traffic clocks simply show the preset time. This project has been executed by utilizing the MATLAB programming and it means to forestall overwhelming traffic blockage. This undertaking measures the quantity of vehicles present out and about. Additionally, for executing this undertaking Image handling method is utilized. From the outset, film of a path is caught by a camera. A web camera is set in a rush hour gridlock path that will catch pictures of the street on which we need to control traffic. At that point these pictures are proficiently handled to know the traffic thickness on the quantity of tally of vehicles. As per the prepared information from MATLAB, the controller will send the order to the traffic LEDs to show specific time on the sign to oversee traffic.

KEYWORDS: Intelligent traffic light signal, Traffic light cycle, Traffic density count, Object detection and counting, Real time traffic monitoring, AI based traffic model.

I. INTRODUCTION

Traffic is the primary wellspring of the city life. Without a proper traffic signal control system, the probability of traffic clog will be extremely high and tedious. The majority of traffic signal control systems are as yet utilizing independent system, where each traffic signal length has been dictated officially. This causes the traffic signal unfits to adjust to the traffic thickness, which frequently prompts the gathering of vehicles, traffic clog and wastage of time. For instance in the event that one path has less traffic and the other path with enormous traffic however, the term of green light for both paths be the same then this is the misuse of accessible assets and is wasteful. By considering the above model if the path with higher traffic thickness should turn on the green sign light for a more extended period than the path with lesser thickness [1].

II. EXISTING SYSTEM

The traffic lights utilized in India are essentially pre-timed where in the hour of every path to have a green sign is fixed. In a four path traffic signal one path is given a green sign at once. In this way, the traffic light permits the vehicles of all paths to go in a succession. Along these lines, the traffic can progress either straight way or turn by 90 degrees. So regardless of whether the traffic thickness in a specific path is the least, it needs to stand by pointlessly for quite a while and when it gets the green sign it superfluously makes different paths hang tight for much longer spans. Numerous techniques had me acquainted with take care of the issue of traffic utilizing sensor and fuzzy logic methods. But the issue continuous explaining the issues is as yet a tested. This issues can defeat by utilizing Digital Signal Processing Technique i.e. Image Processing.

III. PROPOSED SYSTEM

For the real time traffic light control image processing is the method used which beats the disadvantage of the past standard strategies. The vehicles are recognized by the system through images rather than electronic sensors implanted in the asphalt. A camera will be nearby the traffic light. It will catch the image. Image processing is the better strategy to control the state change of traffic light. It shows that it can diminish the traffic and keeps away from the time being squandered by the green light on an unfilled street. It is likewise progressively

dependable in assessing vehicle nearness since it utilizes real traffic images. It visualizes the practically, so its functions obviously superior to those systems that depend on the detection of the vehicles.

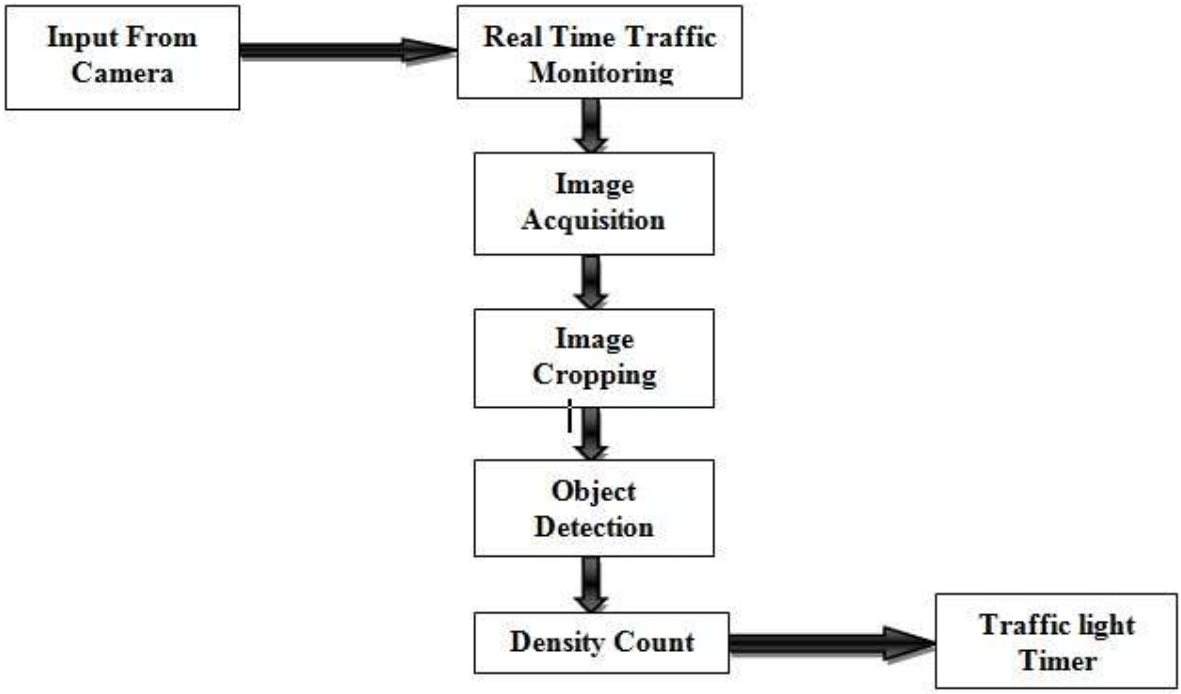

Fig-1: Block Diagram of proposed System

A. Traffic signal control system components:

Traffic signal control system is one of the most dynamic inquire about territory in intelligent transportation system (ITS) inquire about, in light of the fact that this research makes an immediate commitment on proficiency of urban transportation system. Throughout the years numerous specialists directing research in the ideal control of traffic signal. There are three significant segments or parameters in the traffic signal control system as follows.

1) **Cycle times**: Period of one traffic light cycle, to decide the duration of each period of red, yellow, and green light.
2) **Green split**: The length of green light period on every street at the convergence.
3) **Offset**: The relative time contrast between the beginning of the green light at the convergence and the beginning of the green light at the neighboring convergences.

B. Hardware Modules:

1) Webcam
2) GPU processors
3) Operating system
4) Power Supply

C. Software Modules:

1) Python (version 3) support IDE (Jupiter Notebook)
2) MATLAB
3) System
4) OpenCV
5) Cascade Trainer
6) Data set

IV. METHODOLOGY

The software system implementation is partitioned into 5 sections. The initial segment is to process the video signal and image acquisition from fixed camera utilizing MATLAB. The second part is to select the target where the vehicles could be available by utilizing image trimming procedure. The third part is the object recognition which is performed by enhancing features of the image. The Fourth part is the density count including in which we are counting the quantity of vehicles. At last, the last part is allocating time to open the sign as per the density count.

A. Video signal and Image Acquisition processing:

The work begins with processing the live video using camera is stationary, which is to extricate the casings constantly from the ongoing video originating from the stationary camera. This raw digital data is further processed by converting the images from RGB (Red-Green-Blue) to grayscale picture of an empty street when there is no vehicle present; this picture is reference picture which is caught from the live video at the point when the street is vacant [2].

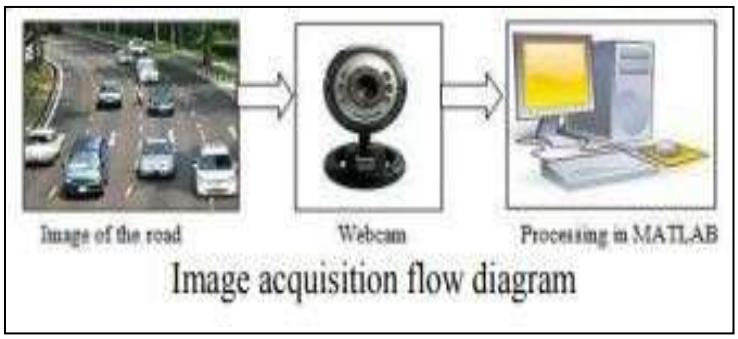

Fig-2: Image and video processing

B. Image Cropping:

The subsequent advance is to choose the focused on zone by planning in MATLAB [3]. The motivation behind editing is to distinguish the street area where the vehicles are introduce and reject the pointless foundation data is fixed in each casing of the live video on the grounds that the camera is stationary. To crop the necessary region, we utilized the reference image, First we made a paired picture of having at that point concealed white the street territory, and concealed dark the extra locale intrigue. At long last, we duplicated the reference acquire the last wanted objective methodology of article identification [2].

C. Object Detection:

The third step is the article or vehicle identifying vehicles which are available in the focused on zone appeared in discovery, first we extricated the edge from the continuous video arrangement. The subsequent stage is to change over the two images; the reference image and the ongoing image into grayscale and then we determined the absolute difference of two images. Since the dimensions of the road are fixed therefore the difference image only highlights of the vehicles in the desired target area. The next step is to convert each images; the reference image and also the real time image, and so, we tend to determine absolutely the distinction of 2 dimensions of the road are fastened therefore the distinction image solely highlights the topographic point [4]. The distinction image is illustrated in shows the presence of vehicles within the desired topographic point, however, the visibility of the vehicles are not clearer therein image. To boost the visibility of the distinction image to a b into grayscale, and so, we tend to determine the scale of the road are fastened so the distinction image solely highlights the vehicles within the desired target [4].

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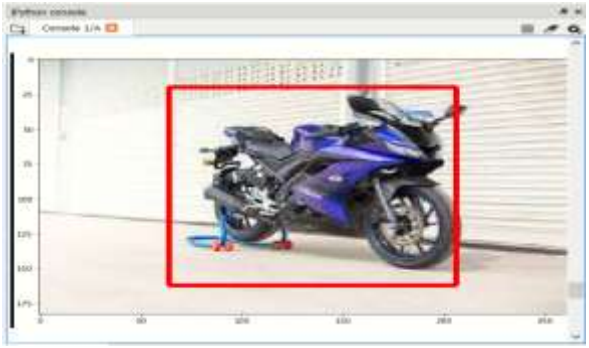

Fig-3: Object Detected

D. Traffic Density:

The subsequent stage is to ascertain the traffic density in the ideal objective territory. So as to decide the traffic density, first we marked the vehicles and afterward checked their number. So as to count the quantity of vehicles, we scanned for connecting pixels. So as to think about an associated district as a vehicle, we characterized a threshold. Nonetheless, it is conceivable that more than one area of a vehicle is recognized utilizing the above criteria. To defeat this issue, we find the covering jumping boxes of the chose districts and accordingly sifted through littler and exceptionally covering locale [5]. To count the objects present in the image the nearby limits of the articles are distinguished. The exterior boundaries of the objects as well as the boundaries of holes inside these objects in the binary image are tallied to recognize the vehicles which are available in the focused on territory [5].

Fig-4: Object Count

E. Traffic Light Cycle:

The subsequent stage is to figure the traffic thickness in the ideal target zone. The Traffic signals are taken care of dependent on the outline thickness of the paths of the traffic. The calculations scan for a lot of interfacing pixels. So as to think about an associated locale as a vehicle, a base edge has been characterized. In any case, it is conceivable that more than one locale of a vehicle is recognized utilizing the above models. This issue could be overwhelmed by finding the covering jumping boxes of the chose locales and consequently littler and exceptionally covering areas are sifted through. As per the density count the delay for the lights is programmed through MATLAB and traffic light duration changes [5].

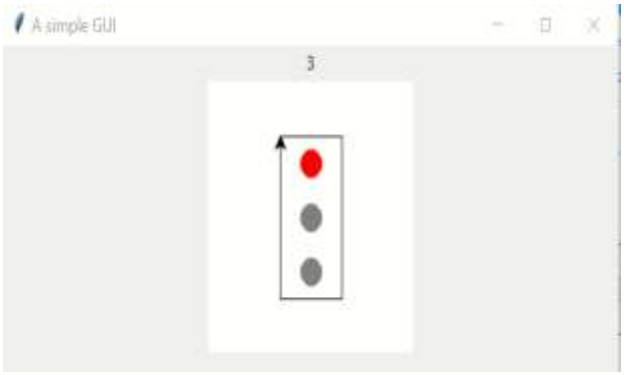

Fig-5: Traffic light demonstration

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V. WORKING OF SYSTEM

The analysis is disbursed to cut back the tie up by hard the traffic density in a very explicit direction of the road by victimization image process algorithms. The system starts with a picture acquisitions method within which the live video is processed by the stationary camera, mounted on any pole. Then one frame per second endlessly extracts from the live video and processed every frame by changing it into grayscale. For the reference image we to tend to designate associate empty road image once there's no traffic on the road. The second step is the image cropping within which we to tend to primarily designate the targeted space wherever the vehicles square measure gift and filtrate redundant close info. Then we to tend to determine the presence of objects in live video by taking absolutely the distinction of every extracted frame with the reference image. Then the presence of objects is increased by binarization of the distinction image then the ultimate step is to calculate the traffic density within the desired topographic point by reckoning the quantity of vehicles in this region. To perform this, 1st we tend to outline the vehicles within the targeted region by scanning all the connected objects, and filtering out smaller and overlapping objects. To subsume noise added thanks to completely different lighting conditions at different times of the day, we tend to capture and hold on many reference pictures at completely different time slots of the day. The system cycles through these reference pictures according this time of the day[1].

Fig-6: Detected and counted vehicles

VI. RESULTS AND DISCUSSION

The exploration is completed so as to diminish the traffic clog by ascertaining the traffic thickness a specific way of the street by utilizing picture handling calculations. The system begins with a picture procurement process in which the live video is handled by the fixed camera, mounted on any shaft. At that point one casing for each second ceaselessly removes from the live video and handled each edge by changing over it into grayscale. For the reference picture an unfilled street picture was chosen, when there is no traffic out and about. The subsequent advance is the picture trimming in which, the focused on region is chosen, the region where the vehicles are available and sifted through pointless encompassing data. Next stage, decides the nearness of articles in live video by taking the supreme contrast of each extricated outline with the reference picture. At that point the nearness of articles is improved by binarization of the distinction picture. At that point the last advance is to compute the traffic thickness in the ideal target zone by including the quantity of vehicles in that area. To play out this, first, the vehicles are set apart in the focused on district by checking all the associated protests, and sifting through littler and covering objects [1].

Table-1: Traffic Cycle for all 4 cases

S.No.	Traffic Density Count (number of vehicles(N))	Traffic light cycle (in seconds)
1	N <= 20	10
2	N <= 40	20
3	N <= 60	30
4	N > 60	40

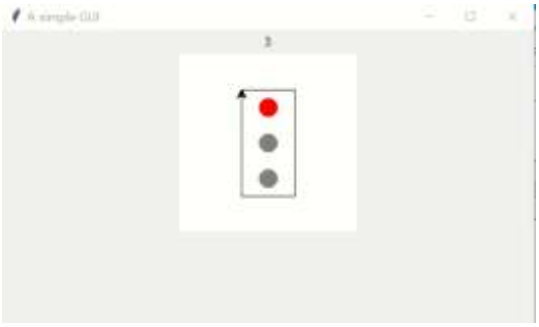

Fig-7: Resultant traffic light timer demonstration

VII. ADVANTAGES

The significant bit of this system is the adjustment of the cycle time frame to the whole locale's traffic profile. Maintain a strategic distance from the time being squandered by a green light on a vacant street. Adaptable as it changes the planning of traffic lights as per the genuine street condition Obstacle shirking to stay away from bother.

FUTURE SCOPE

The current system utilizes a solitary camera for checking traffic at a crossing point. By utilizing a different camera for every street at a crossing point will permit the system to utilize video processing which can improve the system efficiency further. The vehicle objects can likewise be ordered into different classes relying on the geometrical shape of vehicle for obstructing the entry of enormous vehicles e.g., trucks during day times. The crisis mode can be refined further by introducing a GPS beneficiary in rescue vehicle with the goal that the base station will monitor the emergency vehicle area consistently and clear the street at whatever point will be required. Also to detect emergency service vehicle and let them go first by opening the signal for more time.

VIII. CONCLUSION

In this project, a technique for estimating the traffic victimization Image process is conferred. This is often done by victimization the camera pictures captured from the road and videos taken are born-again to the image sequences. Every image is processed on an individual basis, and therefore, the variety of vehicles has been counted. The benefits of this new methodology embody such benefits as use of image process over sensors, low cost, simple setup and comparatively sensible accuracy and speed. As a result of this methodology has been enforced victimization Image process, and MATLAB computer code, production prices are low whereas, achieving high speed and accuracy.

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